

STATE BOARD OF HEALTH

INDIANAPOLIS

REFERENCE 60

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OFFICE MEMORANDUM

DATE: December 6, 1977

TO: File-Cary Land Development
Landfill, Lake County

THRU:

FROM: Jim King

SUBJECT: Geologic Description and Evaluation

GEOLOGY

The bedrock at this site consists of Middle Silurian (Niagaran) dolomites that dip gently toward the northwest. About 160 to 170 feet of unconsolidated material lies above the bedrock at the site and may be divided into three distinct units. The deepest unit is a silty, pebbly clay till which rests upon the bedrock. In this area, the basal part of this unit is a zone of sand and gravel about 15 feet thick which is part of a narrow valley-fill deposit. Above this unit is a silty, sandy and pebbly clay till with discontinuous lenses of sand and gravel. This clay is subject to cracking and is very hard when dry. The unit exposed at the surface consists of 25 to 35 feet of very fine-grained beach and dunal sand that is stratified and moderately cross-bedded. It contains some thin partings of silt and clay. An 18-inch layer of silt separates the sand from the underlying clay.

SURFACE WATER

The Grand Calumet River is located less than 10 feet from the southern property boundary and flows toward the west. In addition, polluted ponded water and leachate holding areas exist on the site premises.

GROUNDWATER

The use of groundwater near this site is low due to the availability of municipal water and to a lack of residential development. The small amount of groundwater that is pumped near the landfill is chiefly from shallow wells (30 to 50 feet deep) that are finished within the upper sand unit which is entirely saturated under natural conditions. Groundwater exists under unconfined conditions and the original watertable in this area was within two feet of the ground surface. Before the present operation began, the water within the pit which is currently being filled was at about the same elevation as the nearby river, attesting to the hydraulic continuity of the groundwater and surface-water systems in this area. The regional hydraulic gradient was locally southwestward into the river, but the watering of the pit has created a reversal of

the gradient and river water now seeps into the pit area because of the head differential (the pit bottom is approximately 30 feet lower than the surface of the river). The hydraulic conductivity of the deepest till unit is 1.4×10^{-7} cm/sec while that of the clay immediately beneath the sand unit is 3.3×10^{-7} cm/sec. The sand unit has a hydraulic conductivity of .02 cm/sec, a coefficient of transmissivity of 21.6 cm²/sec, and a storage coefficient of 0.12 which indicates that water-table (unconfined) conditions exist.

EVALUATION AND RECOMMENDATION

This site is definitely geologically unacceptable for waste disposal and is a hazard to groundwater and surface-water resources in its vicinity. Groundwater is currently collected in sumps and is pumped into the river at a rate of about 1,000 gpm during the wettest part of the year. After the site is abandoned and pumping ceases, water levels will recover to their pre-dewatering levels and will saturate the filled area. The existence of seepage from the river and local industries into the pit provides obvious evidence of the high permeability of the sand unit into which the refuse is being placed. In June of 1973, the site manager was directed to monitor the quality of water pumped from the pit area into the river and, to date, has not complied. Five monitoring wells have been installed around the site's perimeter, but sample analyses have been submitted only sporadically. Water analyses received thus far show little water-quality degradation, but some primary leachate indicators are absent from these reports. Among other problems documented at this site are the use of sand as cover material and the acceptance of hazardous wastes. Under no circumstances should hazardous wastes be accepted at this site at any time. In addition, a permit from the Department of Natural Resources for floodplain alteration has never been acquired.

I strongly advise that this site institute closure procedures immediately because of the health threat it poses. The problems resulting from the poor geologic environment are further compounded by a lack of willingness of the part of the landfill personnel to adhere to good operational procedures.

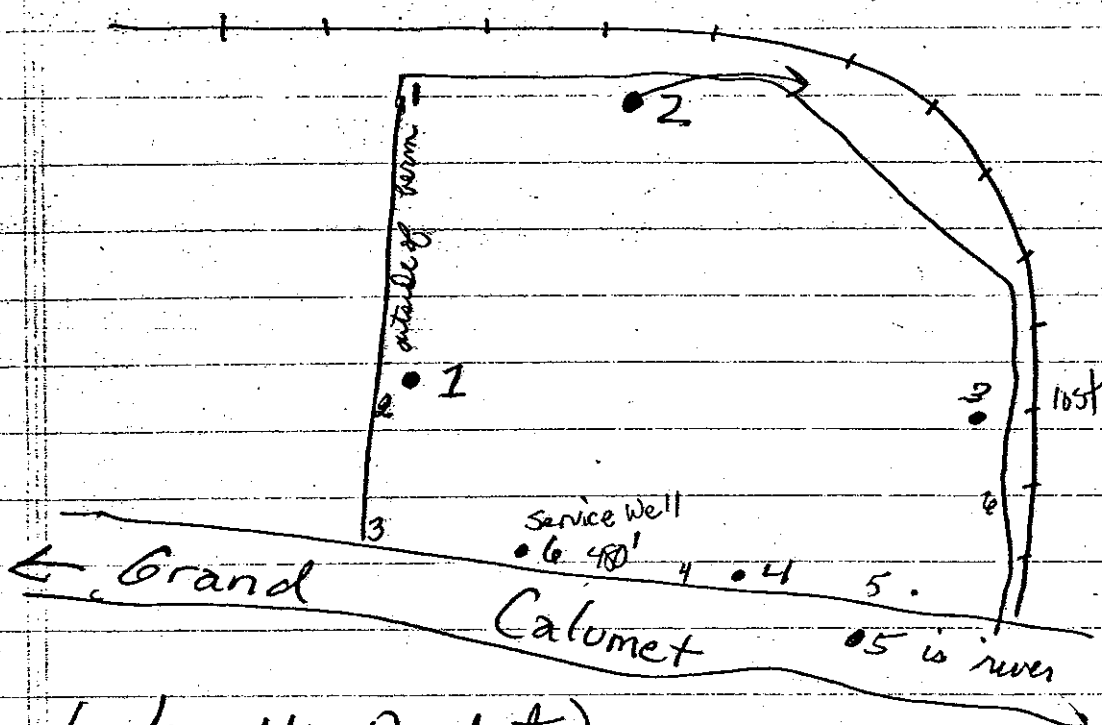
JMKing/ma

$$GW \text{ vel} \approx 57 \text{ ft./dy} \quad (i \approx \frac{1}{2})$$

i = nearly horiz. close to River, little influence on flow rate
 $2'/\text{mi.} = 0.00037$ (approximation of i , probably greater)

$$GW \text{ vel} \approx 0.021 \text{ ft./dy} \quad (i = 2'/\text{mi.}) \approx 7.7'/\text{yr.}$$

Well locations



(See W-Q data)

Logs (water wells)

32-37'

SW

NE

Boiling

35 sd

40 sd

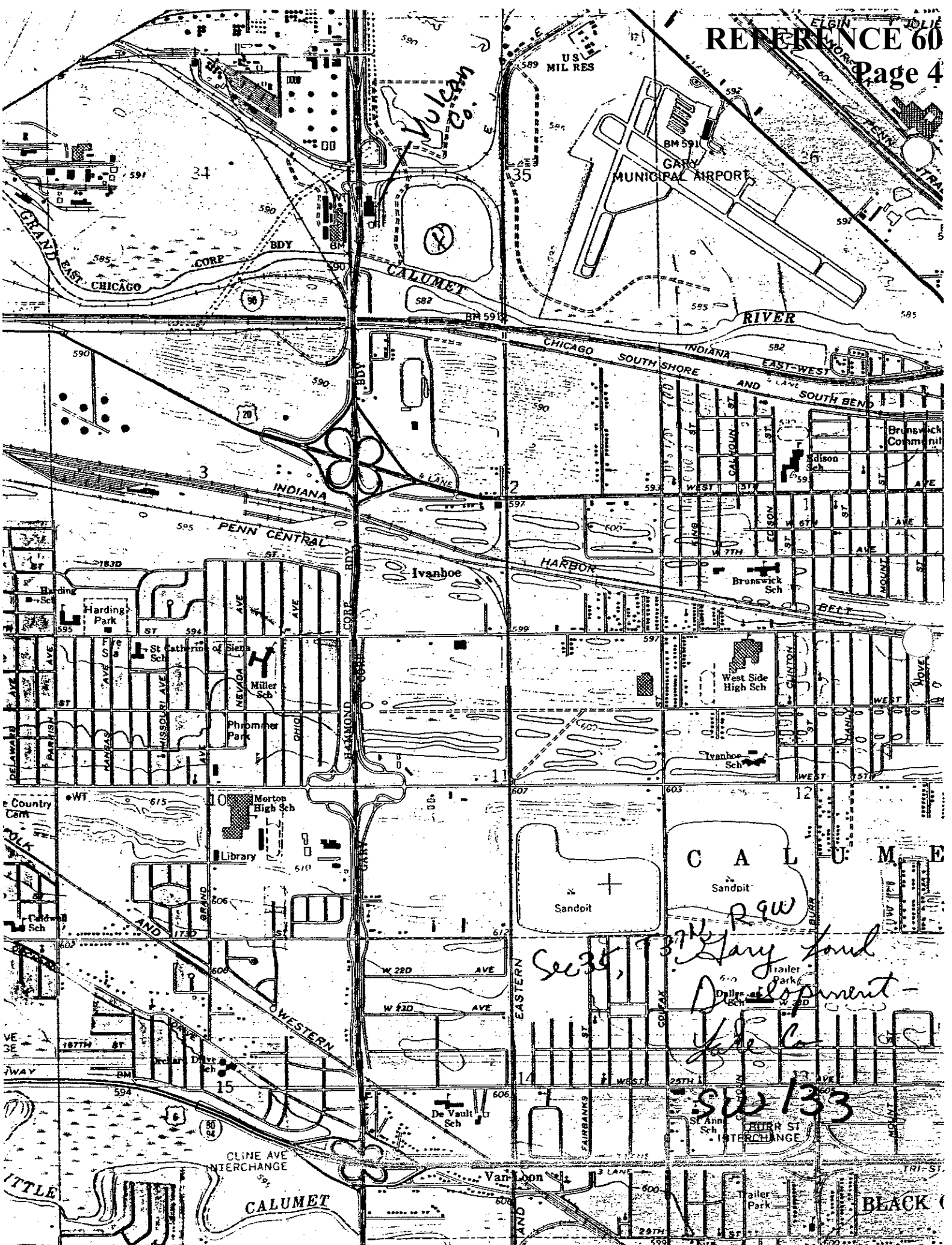
10+ cl

60 cl

45

5+ gn

105



Reasons for Hazardous Waste Restriction

I. Geology of Site

- A. Land pit
- B. High water table
- C.

II Previous Construction techniques

- A. Wall not constructed according to original plans.
- B. Leachate collection & dewatering system not installed entirely
- C. Seepage into the site indicates walls are not sealed.
- D. Leachate collected on site not hauled to treatment facility.

III Operational history

- A. Improper handling of hazardous waste
 - 1. Pits in refuse
 - 2. Dross uncovered
- B. Improper compaction and daily cover.